Proton NMR Characterization of First Sorption Cycle

Anastasiia Nagmutdinova
University of Bologna, IT

Objectives:
This work aims to understand and quantify changes in porous structure of different, controlled oxide mixtures of cement around fast and slow, partial and full de/sorption cycles by using Proton Nuclear Magnetic Resonance (NMR).

Pore Structue and Sorption Cycles

Mechanisms involved in the drying process are complex and are often interrelated. These are mainly due to the wide range of the pore size distribution in standard cement, which determines, to a large extent, the different water transport mechanisms during drying.

Characterisation of Sorption Cycles

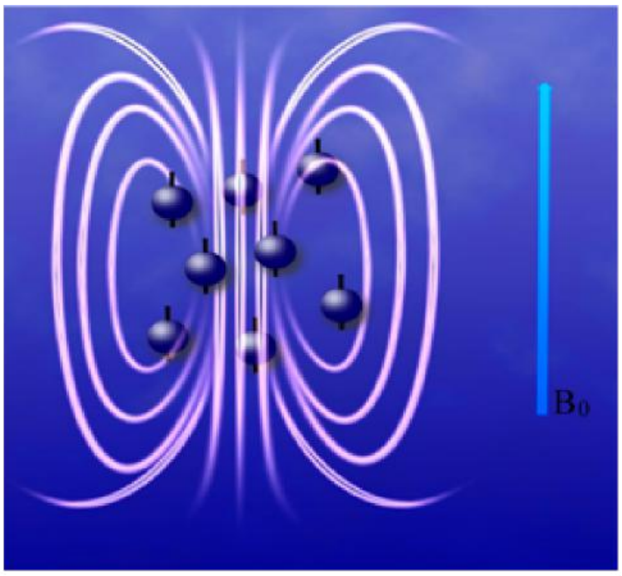
NMR measurements show that the pore structure of cement undergoes changes during drying. Interlayer spaces collapse at lowest relative humudities, but re-establish during re-saturation. These suggest reversibility of the cement structure. Other experiments suggest that solid cement components might undergo changes during drying, but re-establish during re-saturation.

Why use Proton NMR ?

It is a non-invasive and non-destructive technique, used to characterize porosity and pore size distribution in a wide range. It is possible to quantify the structural components of the cement paste. Using different kinds of experiments, it is also possible to analyze diffusion, permeability or allowing separate measurements of surface and subsurface properties.

How does moisture content affect pore structure?

Reversible and irreversible changes to the microstructure of cement paste are a result of different phenomena acting simultaneously. It has been observed that the moisture content, measured by relative humidity, plays a role in affecting strong capillary forces, the ink-bottle effect, disjoining pressure and surface tension.



For further information please refer to the following link: https://www.erica-etn.eu/

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